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METHOD AND APPARATUS OF FORMING FREE FLOWING FROZEN MINCE MEAT

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(56) Prior Art Documents
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FR 2513856

(57) Claim

9. An apparatus for forming free flowing frozen meat mince, said apparatus comprising in cascade connection a shredder for frozen meat, a comminution means for comminuting the output of said shredder, and a cryogen applicator means for intermingling the output of said comminution means with a cryogen.

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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

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ASSOCIATED PROVISIONAL APPLICATION DETAILS

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The following statement is a full description of this invention, including the best method of performing it known to me/us:-

The present invention relates to food processing and, in particular, to the production of free flowing mince meat.

Mince meat is a staple food and is consumed in very large quantities. During the conventional mechanical mincing of fresh meat, a certain amount of frictional heat is generated which assists in activating protein present in the meat. This tends to make the particles of meat adhere together. This adherence is further increased by freezing mince meat since moisture within the meat freezes the various particles together.

Some frozen products such as frozen peas are able to be maintained within a domestic freezer, for example, within a plastic bag and only those peas required to be cooked at a particular time need to be removed from the bag. The remaining contents of the bag can be replaced immediately into the freezer and not be defrosted.

It is known in both Europe and New Zealand to have free flowing frozen mince meat, however, the process by which such mince is made suffers from a number of disadvantages.

It is the object of the present invention to provide an improved method of manufacturing free flowing frozen mince meat in order to substantially avoid or ameliorate the disadvantages of the prior art method.

In accordance with the first aspect of the present invention there is disclosed a method of forming free flowing frozen meat mince, said method comprising the steps of:

(i) shredding frozen meat to create frozen meat shards larger than a desired final mince particle size.

(ii) comminuting said frozen meat shards to produce frozen mince particles of said desired final size, and

(iii) intermingling said frozen meat particles with a cryogen to create said free flowing frozen mince.

In accordance with the second aspect of the present invention there is disclosed apparatus for forming free flowing frozen meat mince, said apparatus comprising in cascade connection a shredder for frozen meat, a comminution means for comminuting the output of said shredder, and a cryogen applicator means for intermingling the output of said comminution means with a cryogen.

In accordance with a third aspect of the present invention there is disclosed free flowing frozen meat mince manufactured by the method of the first aspect of the invention or manufactured by the apparatus of the second aspect of the present invention.

The prior art method of forming free flowing frozen meat mince, and the preferred embodiment, will now be described with reference to the drawings in which:

Fig. 1 is a block diagram schematically illustrating the method of the prior art,

Fig. 2 is a perspective view schematically illustrating the apparatus by which the prior art method is carried out,

Fig. 3 is a block diagram illustrating the method of the preferred embodiment,

Fig. 4 is a schematic perspective view of the first stage of the apparatus of the preferred embodiment,

Fig. 5 is a schematic perspective view of the apparatus of an intermediate stage, and

Fig. 6 is a schematic perspective view of the apparatus of the final stage, the apparatus of all three stages being cascaded together.

As seen in Fig. 1, the method of the prior art involves cutting meat at room temperature in a bowl cutter into small particles of the desired final size, whilst simultaneously applying a cryogen such as liquid nitrogen or carbon dioxide. From this single processing step emerges the frozen free flowing mince.

The bowl cutter 1 used in the prior art method is schematically illustrated in Fig. 2. It will be seen that the bowl cutter 1 comprises a bowl 2 having a central axis 3 about which the bowl rotates. The room temperature meat is loaded into the bowl 2 via a chute 4. Similarly, cryogen is introduced into the bowl 2 by means of a tube 5 or equivalent device.

The bowl cutter 1 is provided with a cutter arm 7 which carries a plurality of scimitar-like cutting blades 8 which rotate at a high speed, typically 3000 rpm. In use the cover arm 7 and cutting blades 8 are covered by means of a pivotal shield 9.

The above described method and apparatus suffer from a number of disadvantages. Firstly, from an operational point of view the cryogens supplied via the tube 5 results in a "mist" of cold gas filling the bowl 2 and overflowing the upper rim of the bowl 2. As a consequence, it is difficult for the operator to see the contents of the bowl and know the degree to which the cutting has progressed. If the cutting is allowed to progress for too long a time, instead of producing frozen mince, frozen meat powder is the result.

Furthermore, the cutter blades 8 which rotate at high speed are subjected to the cryogen and therefore are at a very low temperature. Accordingly, the blades 8 are relatively brittle and are therefore liable to break and constitute a safety hazard to operators of the apparatus. This is because of the high centrifugal forces to which the blades 8 are subjected. In the alternative, it is necessary to purchase special low temperature steel blades which are expensive and therefore add significantly to the cost of the equipment.

A further problem with the above described method is that the food processing plant is often located at a substantial distance from the abattoir where the animals, to provide the necessary meat, are killed. As a consequence, even though refrigerated, the meat begins to deteriorate in quality from the time of killing to the time at which

freezing is completed. As a consequence, the meat which ultimately ends up as free flowing frozen mince under the prior art procedure, may well be several days old before being finally frozen.

Turning now to Fig. 3, the preferred embodiment of the present invention uses frozen meat as its starting material. As a consequence, the meat is able to be frozen at the abattoir immediately after the killing the animal from which the meat is taken and, as a result, the meat is completely fresh when frozen. The process of the preferred embodiment consists of three cascading processing steps namely, shredding, comminution and individual quick freezing.

As seen in Fig. 4 the first step in the process is to shred the frozen meat. This step is carried out in a shredder 12 which consists of a loading station 13 which receives blocks 14 of relatively large pieces of frozen meat such as result from a de-boning procedure at an abattoir. The blocks 14 are pushed by means of a pushing plate 15 into an opening at one end of a housing 16, only part of which is illustrated for clarity.

Within the housing 16 is located a shredding cylinder 18 having a plurality of staggered upstanding cutting blades 19. The cylinder 18 is rotated by means of an electric motor 20. As the cutting blades 19 move past the leading edge of the blocks 14, small pieces of frozen meat are shred or cut from the front face of the block 14. The small pieces of meat are conveniently termed shards 21. The shards 21 fall into a hopper 22 located below the cylinder 18.

The hopper 22 leads into an auger conveyor 24 which transports the shards 21 into the loading hopper 25 of a comminution device 26 which preferably comprises a device known by the brand name COMMITROL and is sold by URSCHEL LABORATORIES INC of the USA. The preferred device comprises model 2100 and utilises a cutting blade assembly having part number 66753 3A120120U which has hitherto been used in the slicing of carrots, not in the production of meat small goods.

As seen in Fig. 4, the COMMITROL device 26 has an auger drive 27 mounted within the loading hopper 25 and powered by an electric motor 28. The loading hopper 25 sits atop a base 29.

The obscured side of the COMMITROL device 26 illustrated in Fig. 4 is seen in Fig. 5. Leading from the loading hopper 25 is an elbow 31 illustrated in phantom in Fig. 5 through which the auger drive 27 delivers the shards 21 to a rotating comminuting knife 32 which is a knife having four blades 39 which rotate inside a comminuting cylinder 34. The cylinder 34 is provided with a large number of rectangular apertures 25 each of which straddles a small step in the saw-tooth interior surface of the cylinder 34. The knife 32 is rotated by means of an electric motor 37 and the blades 33 in combination with the saw-tooth surface 36 cuts the shards of frozen meat into particles of sufficient size to be forced through the rectangular

apertures 35. From here the particles fall into a hopper 38 which again feeds an auger conveyor 39. It will apparent to those skilled in the art that the comminuting cylinder 34 and elbow 31 are covered with a shield or guard (not illustrated) in order to direct all the particles downwardly into the hopper 38.

As seen in Fig. 6, the auger conveyor 39 leads to a substantially conventional cryogenic screw conveyor 40 which is preferably that sold under the Trade Mark Kwik Freeze by COMMONWEALTH INDUSTRIAL GASES LIMITED of Chatswood, Sydney, Australia. The conveyor 40 is provided with an inlet 42 which sits above a U-shaped tough 43 which is insulated from the housing 44 of the conveyor 40. The housing 44 is provided with two lids 45, 46 which are illustrated in the raised position in Fig. 6 so as to reveal the interior of the trough 43. Extending along the length of the trough 43 is a spiral scraper conveyor 48 supported by spokes 49 which extend from a central shaft 50 which is rotated by means of an electric motor 51. By rotation of the spiral conveyor 48, material loaded via the loading tube 42 is moved along the trough 43 and into a discharge chute 52 which in turn leads to a conventional packing station via a conveyor 53. The lid 45 is provided with a pair of fans 47 which circulate cryogen in the form of liquid nitrogen supplied via piping 54 and nozzles 55. This gas is exhausted via tube 57.

The frozen meat particles supplied by the auger conveyor 39 pass through the loading tube 42 and into the trough 43 where they are intermingled or mixed with the liquid nitrogen causing a rapid temperature reduction into a deep frozen state. In this state the already frozen particles are not frozen together but instead are free flowing and remain so provided they are kept below freezing (-4°C) and preferably below a temperature of -15 °C.

It will be apparent to those skilled in the art that the above described process and apparatus provide a number of advantages. Not only is the meat generally fresher because it is frozen at the abattoir, but the breaking down of the meat into small pieces does not generate sufficient heat to cause the meat to become unfrozen. As a result, the protein within the meat which normally acts as a glue-like agent is not activated. Furthermore, the comminution step is easy to control since the particle size is determined by the nature of the comminuting knife 32 and comminuting cylinder 34. Consequently, the particle size is substantially independent of operator skill or processing time. Most importantly, however, because the meat is cut whilst in frozen state, the particles making up the mince maintain their integrity and structure throughout and therefore are less transformed or processed by the apparatus and procedure.

The foregoing describes only one embodiment of the present invention and modifications, obvious to those skilled in the art, can be made thereto without departing from the scope of the present invention.

The claims defining the invention are as follows:-

1. A method of forming free flowing frozen meat mince, said method comprising the steps of:

(i) shredding frozen meat to create frozen meat shards larger than a desired final mince particle size,

(ii) comminuting said frozen meat shards to produce frozen mince particles of said desired final size, and

(iii) intermingling said frozen meat particles with a cryogen to create said free flowing frozen mince.

2. The method according to claim 1 wherein the frozen meat is shredded from blocks of deboned meat.

3. The method according to claim 1 or claim 2 wherein said shredding is carried out by a cylinder type shredder having a plurality of upstanding cutting blades.

4. The method according to claim 3 wherein said blades are staggered longitudinally or circumferentially.

5. The method according to any one of claims 1 to 4 wherein the shards are comminuted in a comminuting device comprising a rotating comminuting knife having a plurality of blades, said knife rotating within a comminuting cylinder having a plurality of apertures, each said aperture straddling a corresponding step in the interior of said cylinder, and wherein the comminution is achieved by cutting said shards between the comminuting knife and corresponding step in said cylinder interior to produce a smaller meat particle.

6. The method according to claim 5 wherein the comminuted particle size is determined by the size of the apertures in the comminuting cylinder.

7. The method according to any one of claims 1 to 6 wherein said intermingling of the particles with cryogen is carried out in a cryogenic screw conveyor.

8. The method according to any one of claims 1 to 7 wherein the cryogen is selected from the group consisting of liquid nitrogen and liquid carbon dioxide.

9. An apparatus for forming free flowing frozen meat mince, said apparatus comprising in cascade connection a shredder for frozen meat, a comminution means for comminuting the output of said shredder, and a cryogen applicator means for intermingling the output of said comminution means with a cryogen.

10. The apparatus according to claim 9 wherein the shredder comprises a cylinder type shredder having a plurality of upstanding cutting blades.

11. The apparatus according to claim 10 wherein the cutting blades on the shredder are staggered longitudinally and cir umferentially.

12. The apparatus according to any one of claims 9 to 11 wherein the comminution means comprises a rotating comminuting knife having a plurality of blades,

said knife rotating within a comminuting cylinder having a plurality of apertures, each of said apertures straddling a corresponding step in the interior of said cylinder.

13. The apparatus according to any one of claims 9 to 12 wherein the apertures in the comminuting cylinder are selected in accordance with the desired final particle size.

14. The apparatus according to any one of claims 9 to 13 wherein the cryogen applicator means is a cryogenic screw conveyor.

15. A method of forming free flowing frozen meat mince, said method being substantially as described with reference to Figs. 3 to 6 of the drawings.

16. An apparatus for forming free flowing meat mince, said apparatus being substantially as hereinbefore described with reference to Figs 3 to 6 of the drawings.

17. A free flowing frozen meat mince manufactured by the method according to any one of claims 1 to 8 and 15 or manufactured by the apparatus according to any one of claims 9 to 14 and 16.

Dated this First Day of September, 1995
Woolworths Limited
Patent Attorneys for the Applicant/Nominated Person
SPRUSON & FERGUSON

Method and Apparatus of Forming Free Flowing Frozen Mince Meat

Abstract

An apparatus is described for forming free flowing frozen meat mince which comprises in cascade connection, a shredder 18 for frozen meat 14; a comminution means 26 for comminuting the output 21 of the shredder and a cryogen applicator means 43 for intermingling the output of the comminution means with a cryogen.

Fig. 4

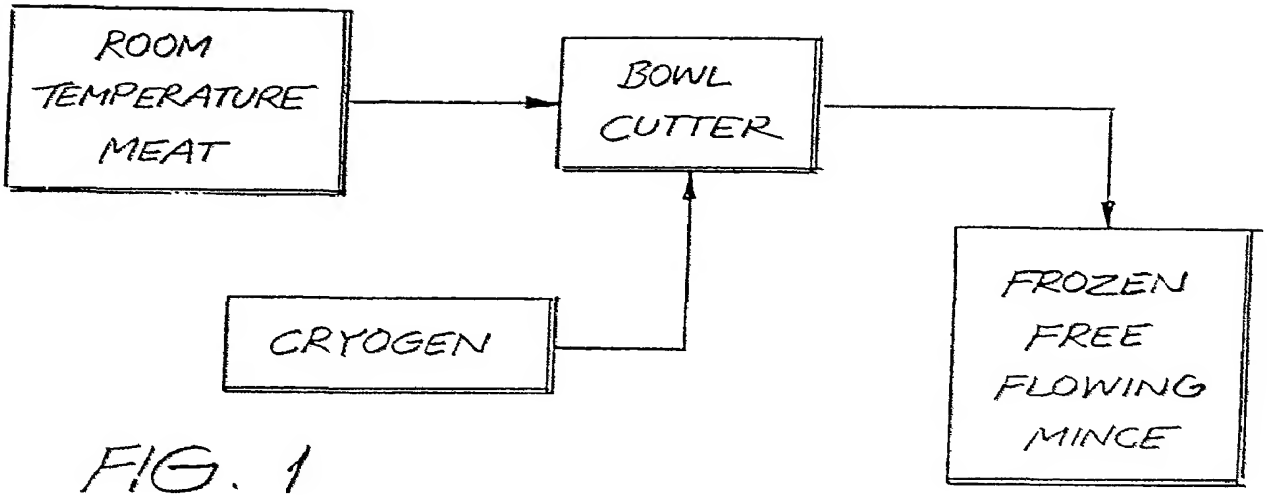

FIG. 1
(PRIOR ART)

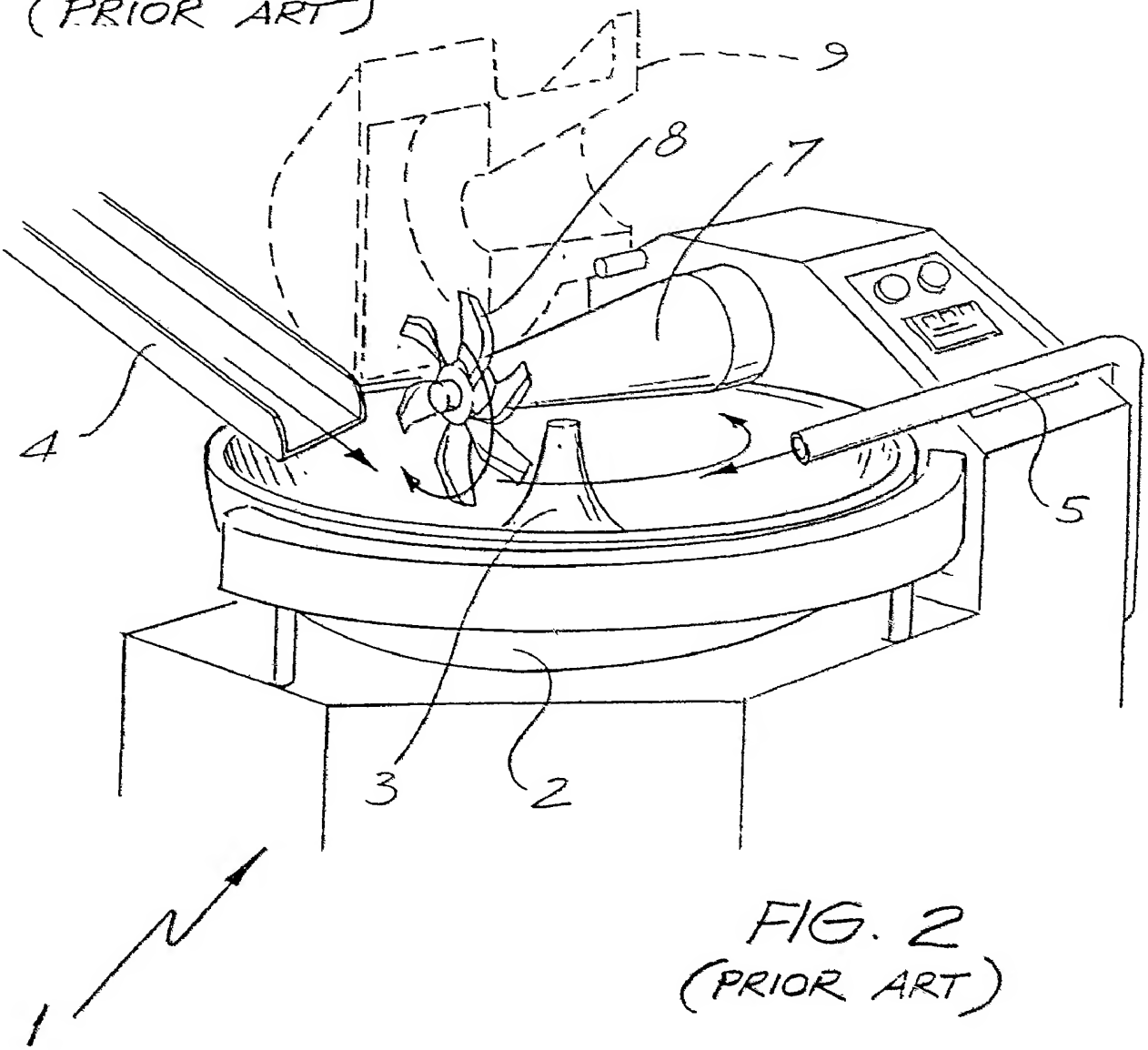

FIG. 2
(PRIOR ART)

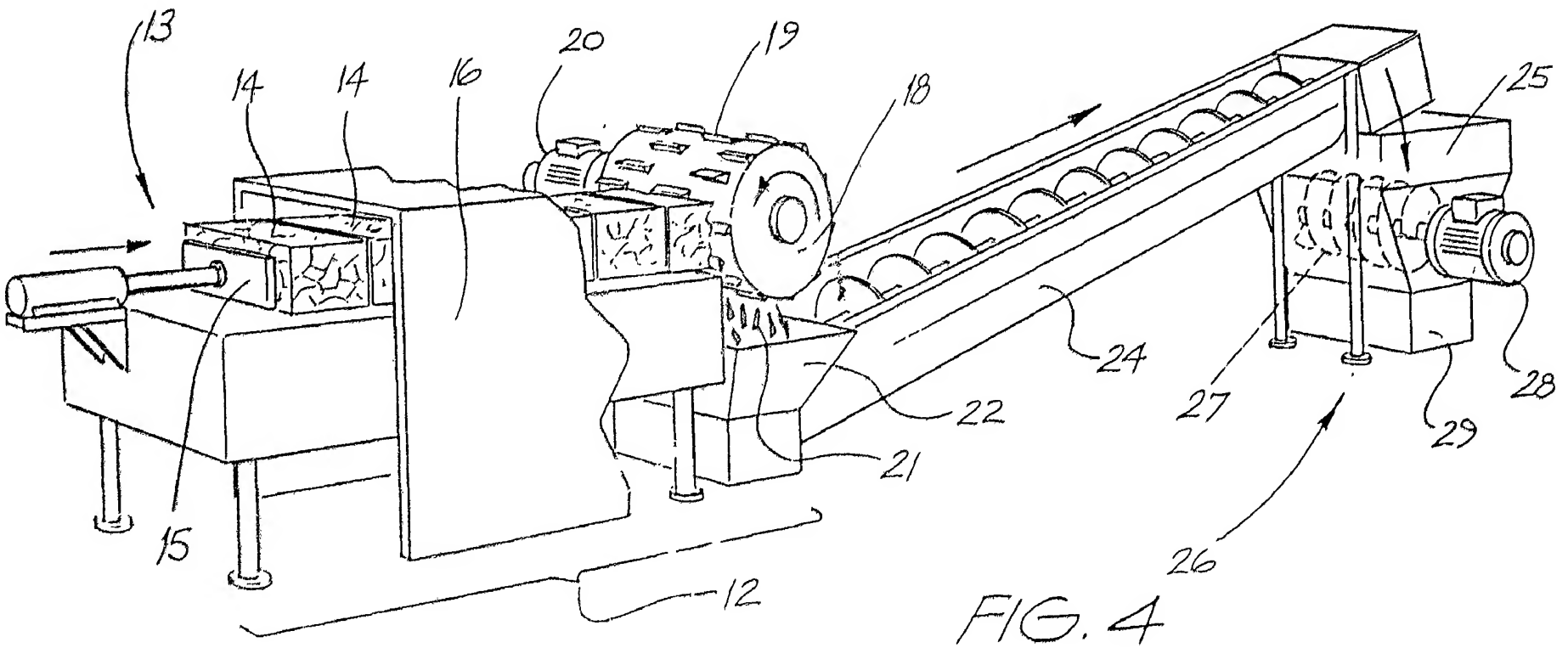

FIG. 4

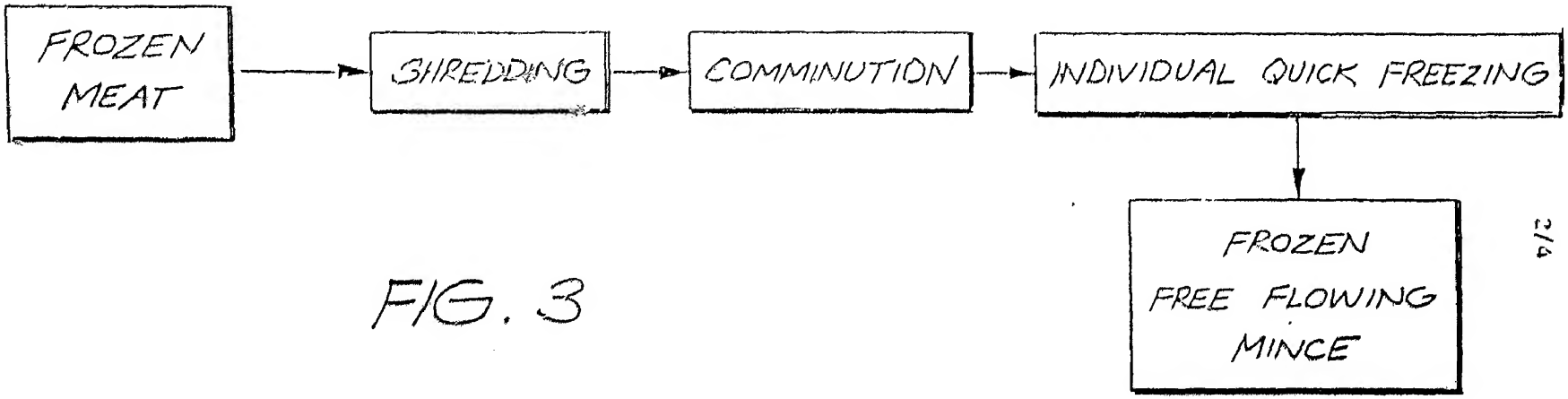

FIG. 3

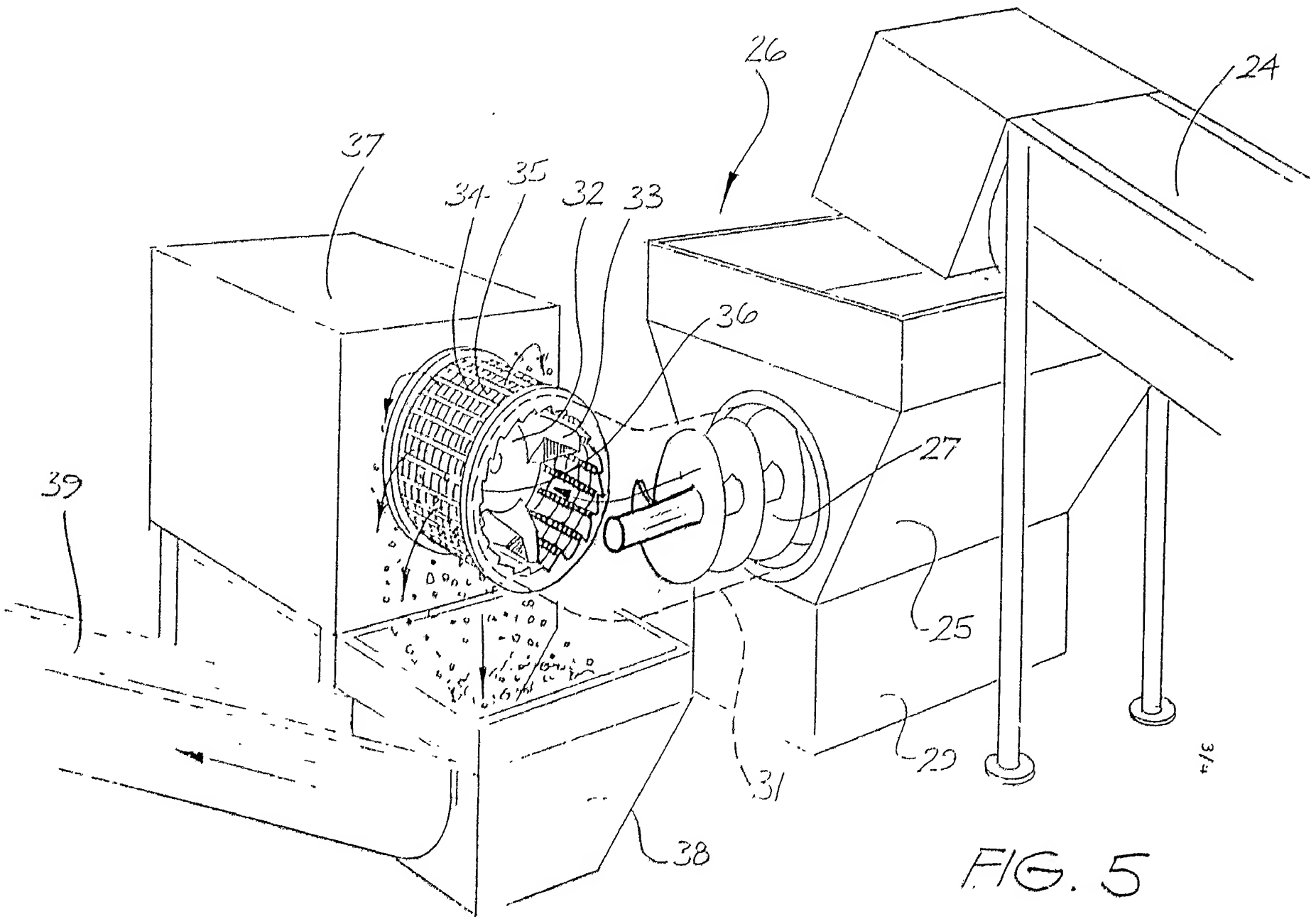

FIG. 5

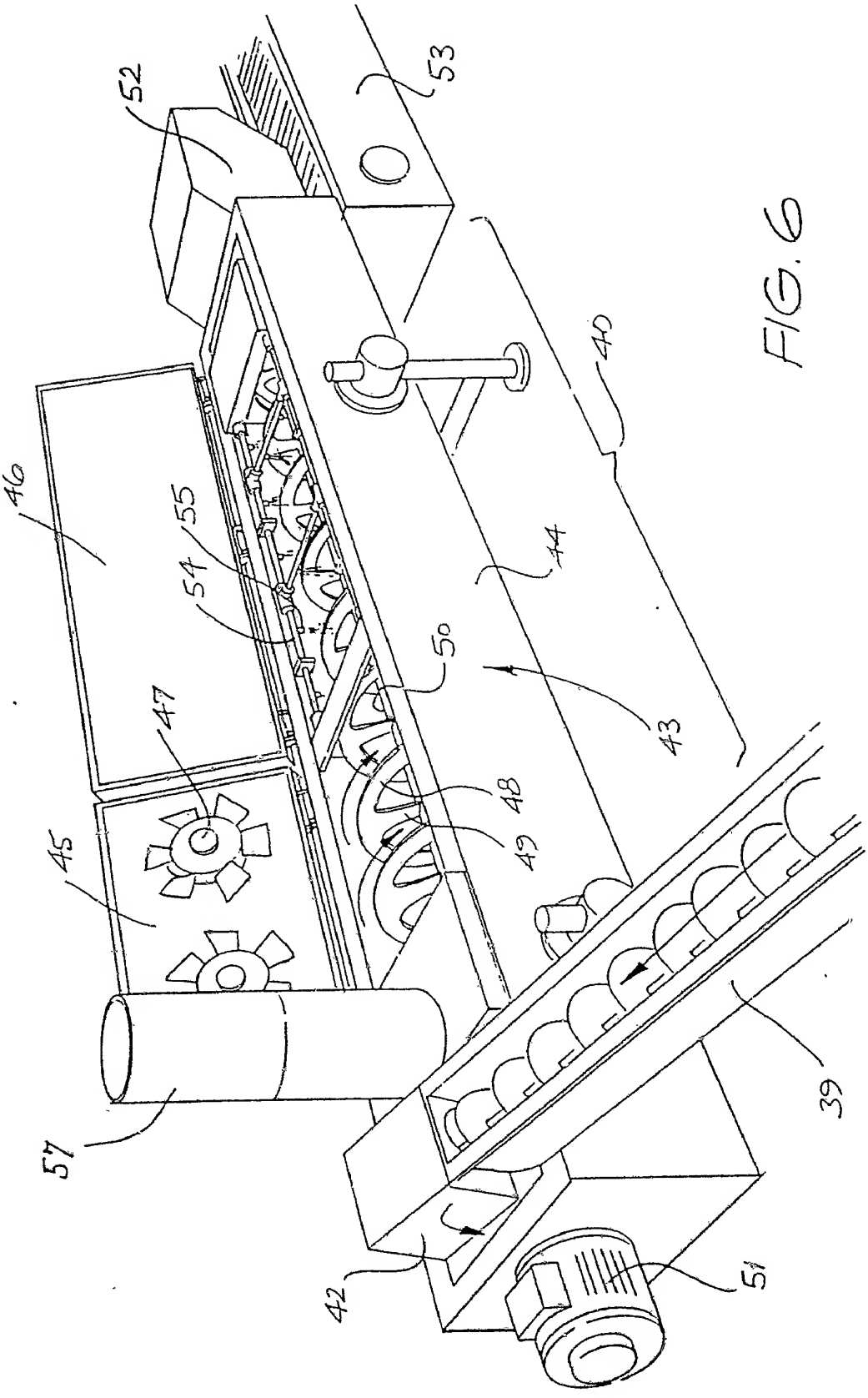

FIG. 6